The Builder.

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IN the present Number we have the pleasure to lay before our readers a view of the Hungerford suspension bridge for foot passengers, constructed under the direction of Mr. I. K. Brunel, which will be opened publicly on Friday, the 18th of this month. The engraving shews the bridge as it appears seen from the Middlesex side, a little to the west of the market, and gives an accurate notion of its general arrangement and form. It consists of three arches; the span of the centre is 676 feet 6 inches, and that of each of the side arches 333 feet. The height of the roadway from high-water mark at the abutments, is 22 feet 6 inches; at the piers, 28 feet, and in the centre, 32 feet; so that it cambers in the whole, 9 feet 6 inches. The clear width of the roadway is 14 feet, and the height of the two towers, or piers, which carry the chains, is 58 feet above the road. These towers, which are 22 feet square, consist each of four solid piers of brickwork in cement, 7 feet 6 inches square, connected by inverted arches at the bottom, and are built on the natural bed of the river without piles. They are Italian in style, and were designed by Mr. Bunning to accord with buildings appertaining to the market.

For the foundation of the abutments, piles 26 feet long were driven in an inclined direction. On the south side this was effected with much difficulty, the soil being formed by accidental causes into concrete of very great hardness. The platform, or roadway, is carried by four chains, in two lines, with single suspension-rods on each side, 12 feet apart. The chains pass over rollers in the upper part of the towers, so as to equalise the strain, and are secured in tunnels at the abutments to two iron girders, 44 feet long and 5 feet deep, solidly embedded in a mass of brickwork in cement, further strengthened and backed up with concrete. It is hardly necessary to say, that this is a most important part of the construction, and demanded the greatest care.

The suspension-rods carry two longitudinal bearers of fir, 9 by 9, running from end to end on each side of the roadway, one above the other, and between these are placed the ends of cross-beams, which beams receive a flooring of three-inch deal. The cross-beams are double every 12 feet, that is, at the point where the suspension-rod comes through; (each of the two pieces is 11 by 3, and side by side): the intermediate beams, two in each space, are 11 by 5½. There is a third longitudinal bearer under the cross-beams, down the centre, 10 by 6, and the whole is trussed diagonally, from side to side, with iron. To prevent undulation is of the utmost importance in the construction of suspension bridges, as they are peculiarly liable to damage from this cause; and it has been thought that the injuries to which suspension bridges are exposed from wind arise chiefly from its action beneath the platform: to stiffen this is therefore most essential.

General Pasley urges, in a paper published in the "Transactions of the Institution of Civil Engineers" (Vol. III.), that if the platform, which presents a large surface to the wind acting from below, be kept from undulating, it can scarcely be supposed that the utmost force of the wind could move the chains at all, having comparatively so very little surface to oppose to it, and which must be held down by the great weight of the roadway, so long as *that* remains at rest. The trussing adopted at Hungerford bridge by Mr. Brunel will have the effect of stiffening the platform considerably, and will be further assisted by the cast-iron railing on each side of the roadway. The appearance of the under side of the roadway, viewed at one end, is very curious, from its narrowness, great length, and the effect of the trussing: it resembles, in some degree, the back bones of a fish, and exemplifies in a striking manner the theory of vanishing lines.

The span of the main arch of this bridge is much larger than any other in this country. The greatest span of Hammersmith suspension bridge is 422 feet; of the Union bridge across the Tweed, near Berwick, 449 feet, and of the Menai bridge, Beaumaris, 560 feet.* It is only second to the suspension bridge at Fribourg, in Switzerland, the span of which, from pier to pier, is nearly 900 feet.

The first stone of the Hungerford bridge was laid in 1841. The total cost, including the purchase of property parliamentary, law, and other expenses, is 110,000*l.* The approaches on the south side of the river require improving, and for this purpose a Bill is now before Parliament. It is proposed to obtain a direct communication with the York-road. On the Hungerford side the platform joins the centre of the terraced roof of the colonnade between the two taverns, whence the traffic will pass through the galleries over the colonnades of the fish-market, by the level of the general market, to Hungerford-street and the Strand. The toll is to be a halfpenny each person, and it was originally estimated that the annual return would be—ordinary traffic 8,000*l.*, traffic from Lambeth to Hungerford Market, 260*l.*; for the sight of matches on the river, 250*l.*; traffic to and from steam-boats, 300*l.*; rent of unappropriated property, 200*l.*; total 9,010*l.* As a point for embarking or debarking, there is a commodious flight of stairs in each pier, which will probably supersede the unsightly wood-piers now in use.

Mr. P. P. Baly, the author of the selected design for the London Baths and Washhouses, was the resident engineer; Mr. W. Chadwick the contractor for the brickwork, and Messrs. Sandys, Carne, and Vivian (Cornwall), the contractors for the ironwork.

When we view the comparative slightness of the piers, the great length and tenuity of the roadway, and the single suspension-rods, so wide apart, and remember the effect of a gale of wind even in the Thames, it is hardly possible to avoid a doubt as to the stability of the new bridge during any long period of time; the skill and high attainments of Mr. Brunel, however, forbid the entertainment of this doubt, and we willingly waive it, with perfect faith in his reputation.

We should have mentioned, that all the wood employed in the construction is Paynized, and that the quantity of iron consumed is between 10,000 and 11,000 tons.

The suspension bridge at Fribourg, to which we alluded, is, as most of our readers know, a wire bridge, and has been appealed to in support of the arguments of those who advocate the employment of wire for this purpose in preference to iron bars. The length of Fribourg bridge is, as we said, nearly 900 feet; the height from the water, 175 feet, and the breadth 22 feet; that is, 16 feet for the carriage way, and 3 feet each for the footpaths. The versed sine is 65 feet; the length of the perpendicular suspension wires nearest the pier is about 57 feet, each one diminishing towards the centre of the bridge, where the shortest is only 12 inches. These perpendiculars are 4 feet 8 inches apart, and sustain the extremities of the beams which support the platform. Each of the four cables which form the arch consists of 1120 wires, and it is estimated that the four could sustain 2,678 tons! It was completed in two years and a half, and cost 24,000*l.*†

Although the use of wire offers some advantages, especially superior strength, bulk for bulk compared with bars, general opinion is not in favour of its adoption, on account of the impossibility, nearly, of adjusting the length of the wires, so that when the cable has assumed its proper curvature, each wire may bear its due proportion of strain, and because of the increased liability to oxidate, in consequence of the increased surface offered by wires to the action of the atmosphere. It has been proposed that each wire should be passed through a vessel of varnish immediately after the process of drawing, and that, after forming the wires into bundles of fifty or sixty each, they should be passed through a concave vessel of the oleaginous matter at a high temperature. By this process it is supposed every particle of moisture would be driven off in vapour, and its place occupied by the oleaginous substance in the interior of the cable, where it would be retained by its adhesive property, while it would harden over the exterior, and prevent oxidation, by removing the possibility of moisture coming into contact with the wire.

A suspension bridge of considerable importance is in progress at Clifton, near Bristol, but proceeds slowly; and one of very large size (three main arches of 1,200 feet span each) has been suggested to connect Liverpool with the Cheshire shore, by crossing the Mersey, but is at present "in the air."

* The Trinity suspension pier at Newhaven has three spans of 305 feet each; Brighton chain-pier has four spans of 255 feet each. The bridge over the South Esk, at Montrose, has a span of 432 feet.

† It was opened October 1834.

SHOP-FRONTS, BOWS, AND OTHER PROJECTIONS TO HOUSES COMMENCED BEFORE LAST JANUARY.

IMPORTANT DECISIONS.

IN our leading article of March 22nd (p. 133), and elsewhere since, we asserted (in opposition to instructions said to have been forwarded to the district surveyors from the referees, and proceedings by certain of the district surveyors in consequence) that intended shop-fronts, bows, and other projections, forming a necessary part of buildings duly commenced before the 1st of January last, did not come within the control of the new Act, although still unfinished, and that no notice to the district surveyor before completing such was necessary. Last week we mentioned a case in point, then before us professionally, where the district surveyor had called on the builder of a house, which was roofed in last year, to give him notice before he completed the porch, although that was as much part of the original design as the chimney-stacks; and we stated that we should, of course, resist to the utmost such a preposterous demand.

It is with much gratification we now inform our readers, that our view of the law has been fully confirmed by several awards made since the date of the article in which we argued it; and that if the instructions issued by the official referees did direct the district surveyors that all such projections, if not *completed* before the 1st of last January, must be conformable to the Metropolitan Buildings Act, they having very properly given due consideration to what has been since advanced, have now arrived at another conclusion.